

CLAIMS:

1. Linking unit (100) for generating linking information L indicating components of two consecutive extended segments sp and sc which partially overlap and which may be linked together in order to form a sinusoidal track, the segments sp and sc approximating consecutive segments of a sinusoidal audio or speech signal s, the linking unit comprising:

5 - a calculating unit (120) for generating a similarity matrix S(m,n) in response to received sinusoidal code data including information about the amplitudes and the frequencies of M components x_m with $m=1\dots M$ of the extended previous segment sp and of N components y_n with $n=1\dots N$ of the extended current segment sc, wherein the values of said similarity matrix represent the similarity between the m'th component x_m of said extended 10 previous segment sp and the n'th component y_n of said extended current segment sc for $m=1\dots M$ and $n=1\dots N$; and

- an evaluating unit (140) for receiving and evaluating said similarity matrix S(m,n) in order to generate said linking information L by selecting those pairs of components (m,n) the similarity of which is maximal at least within the an overlapping region;

15 characterised in that

- the sinusoidal code data (D_p, D_c) is enlarged by further comprising information about the phase of at least some of the M components x_m and at least some of the N components y_n ;

- the calculating unit (120) is adapted to calculate the similarity matrix S(m,n) 20 by additionally evaluating the phase consistency between the m'th component x_m of the extended previous segment sp and the n'th component y_n of the extended current segment sc.

2. The linking unit according to claim 1, characterised in that the calculating unit comprises:

25 - a first pattern generating unit (122) for generating said M components $x_m(t)$ with $m=1\dots M$ of the extended previous segment sp in response to the previous segment's enlarged sinusoidal code data (D_p);

- a second pattern generating unit (124) for generating said N components $y_n(t)$ with $n=1\dots N$ of the extended current segment sc in response to the current segment's enlarged sinusoidal code data (Dc); and

- a calculation module (126) for calculating the similarity matrix $S(m,n)$ on the basis of said received M components $x_m(t)$ and of said received N components $y_n(t)$ according to a predefined similarity measure.

3. The linking unit according to claim 2, characterised in that the calculating module (126) is adapted to calculate the overall similarity matrix $S(m,n)$ according to:

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$$S(m,n)=S_1(m,n)S_2(m,n)$$

wherein the first similarity matrix $S_1(m,n)$ represents the similarity in shape and the second similarity matrix $S_2(m,n)$ represents the similarity in amplitude or energy between the components m and n.

15 4. The linking unit according to claim 3, characterised in that the similarity $S_1(m,n)$ is defined according to:

$$S_1(m,n)=\begin{cases} 1-\left|\rho_{m,n}-1\right|/D_1, & \text{if } \left|\rho_{m,n}-1\right| < D_1, \\ 0, & \text{elsewhere} \end{cases}$$

with $0 < D_1 < 1$

and with

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$$\rho_{m,n}=\frac{\sum_t w(t) x_m(t) y_n^*(t)}{\sqrt{E_{xm} E_{yn}}}$$

wherein:

$\rho_{m,n}$: is the similarity measure being a cross-correlation coefficient representing the similarity in shape between components $x_m(t)$ and $y_n(t)$;

25 $w(t)$: is a window function;

$y^*_m(t)$: is the complex-conjugate component $y_m(t)$;

E_{xm} : is the energy in the signal x_m with: $E_{xm}=\sum_t w(t) x_m(t) x_m^*(t)$;

E_{yn} : is the energy in the signal y_n with: $E_{yn}=\sum_t w(t) y_n(t) y_n^*(t)$.

5. The linking unit according to claim 4, characterised in that the second similarity $S_2(m,n)$ is defined according to:

$$S_2(m,n) = \begin{cases} 1 - (1 - R_{m,n}) / D_2, & \text{if } (1 - R_{m,n}) < D_2, \\ 0, & \text{elsewhere} \end{cases}$$

with $0 < D2 < 1$

and wherein

$$R_{m,n} = \min \left\{ \frac{E_{xm}}{E_{yn}}, \frac{E_{yn}}{E_{xm}} \right\}$$

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6. The linking unit according to claim 3, characterised in that the calculating module (126) is adapted to calculate the first similarity matrix $S_1(m,n)$ according to:

$$S_1(m,n) = \begin{cases} 1 - \left| \frac{x_m(t_0)}{y_m(t_0)} - 1 \right| / D_3, & \text{if } \left| \frac{x_m(t_0)}{y_m(t_0)} - 1 \right| < D_3 \\ 0, & \text{elsewhere} \end{cases}$$

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with $0 < D3 < 1$.

7. The linking unit according to claim 6, characterised in that the calculating module (126) is adapted to calculate the second similarity matrix $S_2(m,n)$ according to:

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$$S_2(m,n) = \begin{cases} 1 - \left| \frac{x_m(t_0+1)}{x_m(t_0)} - \frac{y_n(t_0)}{y_n(t_0+1)} - 1 \right| / D_4, & \text{if } \left| \frac{x_m(t_0+1)}{x_m(t_0)} - \frac{y_n(t_0)}{y_n(t_0+1)} - 1 \right| < D_4 \\ 0, & \text{elsewhere} \end{cases}$$

with $0 < D4 < 1$.

8. Parametric encoder (400) for encoding an audio- and/or speech signal s into a datastream including sinusoidal code data and linking information L , the encoder comprising:

- a segmentation unit (410) for segmenting said signal s into at least a previous segment sp' and a consecutive partially overlapping current segment sc' ;

5 - a sinusoidal estimating unit (420) for generating said sinusoidal code data in the form of frequency and amplitude data of M components x_m with $m=1\dots M$ of an extended previous segment sp approximating said segment sp' and of N components y_n with $n=1\dots N$ of an extended current segment sc approximating said segment sc' ;

10 - a calculating unit (120) for generating a similarity matrix $S(m,n)$ in response to said received sinusoidal code data wherein the values of said similarity matrix represent the similarity between the m 'th component x_m of said extended previous segment sp and the n 'th component y_n of said consecutive extended current segment sc for $m=1\dots M$ and $n=1\dots N$;

15 - an evaluating unit (140) for receiving and evaluating said similarity matrix $S(m,n)$ in order to generate said linking information L indicating those pairs of components m,n the similarity of which is maximal;

20 - an arranging unit (430) for generating the datastream representing the original audio- or speech signal by appropriately arranging said amplitude, frequency and linking information;

characterised in that

25 - the sinusoidal code data estimating unit (420) is adapted to further generate information about the phase of at least some of the M components x_m and of at least some of the N components y_n ; and

the calculation unit (120) is adapted to calculate the similarity matrix $S(m,n)$ by additionally considering the phase consistency between the m 'th component x_m of the extended previous segment sp and the n 'th component y_n of the extended current segment sc .

9. Method for generating linking information L indicating components of consecutive partially overlapping extended segments sp and sc which may be linked together in order to form a sinusoidal track, the segments sp and sc approximating consecutive

30 segments of a sinusoidal audio-/or speech signal s , the method comprising the steps of:

- providing sinusoidal code data including information about the amplitudes and the frequencies of M components x_m with $m=1\dots M$ of the extended previous segment sp and of N components y_n with $n=1\dots N$ of the extended current segment sc ;

- calculating the similarity matrix $S(m,n)$ according to a predetermined similarity measure wherein the similarity matrix represents the similarity between the m 'th component x_m of said extended previous segment sp and the n 'th component y_n of said extended current segment sc for $m=1\dots M$ and $n=1\dots N$; and

5 - evaluating said similarity matrix $S(m,n)$ in order to generate said linking information L by selecting those pairs of components m and n the similarity of which is maximal;
characterised in that

- the step of providing the sinusoidal code data further includes the provision of
10 information about the phase of at least some of the M components x_m and of at least some of the N components y_n ; and

- the similarity matrix $S(m,n)$ is calculated by additionally considering the phase consistency between the n 'th component y_n of the extended previous segment sp and the m 'th component x_m of the extended current segment sc.

